

MV-22 Osprey Transition: Bridging the Gap in Medium Lift Assault Support

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EXECUTIVE SUMMARY

Title: MV-22 Osprey Transition: Bridging the Gap in Medium Lift Assault Support

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Thesis: Constrained by low-rate procurement, the Marine Corps MV-22 fielding plan must effectively employ both the CH-46 and MV-22 to meet its medium lift assault support requirements during a fourteen-years transition period to ensure a rapid build-up of combat readiness and the innovative employment of this tiltrotor aircraft.

Background: The Marine Corps' efforts to procure a medium lift replacement aircraft with significant improvements in range, speed, and survivability have finally paid-off. After nineteen official studies, seven Cost of Operational Effectiveness Analysis(COEA) and at one point faced with complete cancellation, the MV-22 program began Low Rate Initial Production in 1997. The first two production aircraft are scheduled to be delivered to VMMA-204, the Fleet Readiness Squadron in 1999. However, after numerous acquisition battles the over past twenty years, the V-22 program hardly resembles its initial joint acquisition plan. Lower production has resulted in increased costs and longer procurement. Today, the MV-22s' procurement plan spans fifteen years from 1999 to 2014. The Marine Corps' medium lift helicopters have continued to age while inventory shortfalls have expanded. The MV-22 fielding plan is complicated by a prolonged procurement plan and the urgent need to replace the Marine Corps' aging medium lift fleet. Marine Corps medium lift requirements will be supported by the combination of its current medium lift fleet and new MV-22 for many years. An effective fielding plan should allow these aircraft to be employed in a method that best utilizes their capabilities, particularly as combat readiness in the MV-22 fleet continues to expand. Premature and improper tasking of the MV-22 could lead to delays in building combat readiness and impede the innovative employment of tiltrotor technology.

Recommendation: Given the current procurement rate, the MV-22 Osprey fielding plan should take full advantage of the Marine Corps current medium lift helicopters capabilities to enhance MV-22 combat readiness and its ability to support the Marine Corps warfighting requirements.

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We must hold our minds alert and receptive to the application of unglimped methods and weapons. The next war will be won in the future, not in the past. We must go on or go under.

-- General Douglas MacArthur¹

The Marine Corps' 1979 decision to delay the replacement of the CH-46 and procure an aircraft with significant improvements established a charted course for its next generation medium lift replacement aircraft. As announced by Lieutenant General T. H. Miller, Jr., Deputy Chief of Staff for Marine Aviation, the Marine Corps would delay the replacement of its primary troop transport helicopter until the early 1990s. Impressed with technology gains of several demonstrator aircraft, Marine aviation challenged the aircraft industry to develop a medium lift replacement aircraft incorporating this new technology. Confident a more survivable aircraft with significant improvements in both range and speed could be fielded to meet this timeline, Marine aviation continued its tradition of leaning forward and applying emerging technology to enhance the quality of support for Marines on the ground.²

Over the past twenty years, Marine aviation held true to this promising course charted by Lieutenant General Miller, even after the 1989 decision by Secretary of Defense, Richard Cheney, to cancel the V-22 program. Although citing this program as too costly during a period of declining defense budgets, Secretary Cheney could not convince Congress to completely drop the V-22 program. Congress continued funding the V-22 for full-scale development (FSD) and testing, while mandating a Cost and Operational Effectiveness Analysis (COEA) be completed before any additional decisions were made

¹ Peter G. Tsouras, *Warrior's Words: A Dictionary of Military Quotations* (London: Cassell, 1992) p. 223.

² Robert W. Smith, "Marine aviation 1979: battling for the best air support possible for the guy on the ground, Interview with the Deputy Chief of Staff for Aviation," *Marine Corps Gazette*, May 1979, 55.

concerning the future of this program. Desperately in need of replacement aircraft for its aging fleet of medium lift helicopters, the Marine Corps was once again forced to consider many of the same aircraft alternatives it rejected over twenty years before.³ Seven separate COEAs' and numerous studies of effectiveness have verified the MV-22 as the proper replacement choice.⁴ Low-rate initial production (LRIP) began in 1997, with the first two production MV-22s scheduled for delivery to the Marine Corps in 1999. To date, the Marine Corps has already purchased sixteen MV-22s and will buy seven more this fiscal year.

Over the last ten years, many articles have been written arguing the advantages of the V-22 over the current medium lift aircraft and several other alternative aircraft. More recent articles have argued that increasing the procurement rate of the V-22 is necessary to replace the aging CH-46 and reduce the total cost of the V-22 program. This paper examines the Marines Corps medium lift assault support requirements as the MV-22 Osprey replaces the CH-46 and CH-53D helicopters. Given the current MV-22 procurement rate, the Marine Corps will not complete the replacement of its current medium lift aircraft until the year 2012. Can the CH-46 continue to operate for another thirteen years? Will the Marine Corps face additional medium lift shortfalls while it waits for new MV-22s to roll off production lines? If shortfalls result, what operational requirements are most critical and what requirements may be disregarded?

³ In 1974, Congress directed the Marine Corps to examine the Army's Utility Tactical System, the H-60 aircraft program, as a possible replacement for the CH-46. The H-60 failed to meet the Marine Corps requirements in trooplifting and external lift capability, particularly for shipboard operations, see LtCol Joe D. Moody, USMC, "Medium Helicopter Assets: Current & Future," *Marine Corps Gazette*, May 1981, 54.

⁴ The seventh and final COEA considered the V-22 in applied maneuver warfare principles, see LtGen Harold W. Blot, USMC, "1995 Aviation Posture Statement," *Marine Corps Gazette*, May 1995, 23; Maj. Timothy G. Hanifen, USMC, "V-22 Osprey: There is no Alternative," *Marine Corps Gazette*, May 1995, 34.

It appears the Marine Corps' perseverance for a significantly more capable medium lift replacement aircraft has finally paid off. However, the associated cost of this process is manifested in a prolonged transition plan complicated with the requirement of replacing a rapidly aging helicopter fleet while simultaneously establishing a solid foundation for tiltrotor support for the Fleet Marine Forces. The general argument presented here is that the Marine Corps' MV-22 fielding plan should effectively employ both the CH-46 and the MV-22 Osprey to meet the Marine Corps medium lift assault support requirements during a fourteen-year transition period. As obvious as this statement may appear, the urgent need for this replacement aircraft should not lead to the simple one for one replacement of the CH-46 that may be detrimental to the innovative employment of this new and different aircraft. The more specific argument of this paper is that given the current procurement rate of the MV-22, its early employment should be focused on building combat readiness and supporting the Marine Corps' warfighting requirements.

WHY THE MARINE CORPS NEEDS THE MV-22 OSPREY

Before we can begin to analyze the Marine Corps' medium lift assault support requirements, we must first understand why the Marine Corps needs the MV-22. In simple terms, two primary reasons stand out why it is necessary for the Marine Corps to procure such an aircraft. First, the Marine Corps is in dire need of a replacement aircraft for its current medium lift assault support fleet. Second, the Marine Corps needs the MV-22 to support its Operational Maneuver From the Sea concept for 21st century warfare.

We will first examine the more easily recognizable requirement for the MV-22 as a replacement aircraft for the Marine Corps' aging CH-46 and CH-53D helicopters. Purchased as a short-term solution to cover helicopter shortfalls or losses for anticipated combat operations in Vietnam, the CH-46 essentially is a military version of the "off-the-

shelf " buy of the Boeing Vertol 107. First introduced to the Marine Corps in June 1964, the CH-46 began supporting operations in Vietnam by March 1966, and it had exceeded 100,000 combat flight hours by August 1968.⁵ During late 1967, catastrophic airframe material failures grounded the CH-46 fleet, nearly threatening early replacement of these helicopters. However, causes for these failures were identified and corrections were made allowing the CH-46 to continue as the workhorse of Vietnam and the backbone of the Marine Corps' helicopter fleet.

The actual plan to replace the CH-46 began over twenty-six years ago. By the mid-1970s, with no clear single replacement aircraft in sight, the Marine Corps began upgrading its remaining D and F model CH-46s to the E model during the CILOP (conversion in lieu of procurement) program.⁶ After the Marine Corps' 1979 decision to keep the CH-46 fleet operational until the early 1990s, its plan included another service life extension program called the survivability, reliability, and maintainability (SR&M) program. Originally designed to extend the CH-46 airframe life to 10,000 hours, engineers have since approved the SR&M program for an additional extension to 12,500 airframe hours, after the medium lift replacement aircraft program was delayed in the early 1990s. This last airframe extension should allow the majority of the CH-46 fleet to operate until about the 2010 timeframe.⁷ Today, the Dynamic Component Upgrade Program (DCUP) is the latest service life extension program for the CH-46. DCUP began replacing the more commonly failed components on the CH-46 in 1995, and covers some major parts overlooked by the SR&M program.

⁵ Jane's World Aircraft, 1970-71., under "Aircraft: USA, Boeing Vertol,"

⁶ Maj. A. J. Allega, USMC, "Making Sure Future Marine Helicopters Meet Requirements of the Modern Battlefield," *Marine Corps Gazette*, May 1977, 48.

⁷ Capt. David W. Coffman, USMC, "21st Century Medium Lift: The CH-46 in the 1998-2005 Timeframe," *Marine Corps Gazette*, May 1994, 42.

The foremost concern for replacing the Marine Corps medium lift aircraft is overcoming airframe number shortfalls. Recognized as early as 1981, the number one reason cited for the HXM program was medium lift fleet inventory shortfalls.⁸ The assault support objective at that time was to lift a Marine Amphibious Force from ship to shore, while simultaneously supporting a second Marine Amphibious Force conducting sustained operations ashore.⁹ During the 1980s, the Marine Corps doctrinal shift to maneuver warfare only further increased the requirement for greater mobility on the battlefield and a heavier reliance on assault support aircraft.

The last CH-46 rolled off the Boeing production line in 1971. By the early 1980s, 275 CH-46s had been converted to the current E model series. Since that time, normal attrition has reduced the Marine Corps inventory to 231.¹⁰ The Marine Corps no longer has the number of aircraft needed to equip HMX-1, the Fleet Readiness Squadron (FRS), and fifteen active and two reserve tactical squadrons. Factoring in depot level work, the Marine Corps is currently 21 airframes short of its table of equipment requirements.¹¹ This has resulted in tactical squadrons operating with less than the twelve authorized aircraft until the later stages of predeployment work-ups. Often last minute aircraft transfers between squadrons are necessary to ensure deploying squadrons have their full authorized number of aircraft.

As the Marine Corps' medium lift inventory shortfall continued to grow, the CH-53D Sea Stallion, originally considered a heavy lift helicopter, was declared a medium lift

⁸ The HXM was essentially the Marine Corps' first medium lift replacement plan that evolved into the JVX, and then finally the V-22 program, see Capt. Charles H. Brown, USN, "Advanced Aircraft for the Future Corps," *Marine Corps Gazette*, May 1982, 40.

⁹ Moody, 53.

¹⁰ Timothy L. Clubb, Maj. USMC, APW, Headquarters U S Marine Corps. E-mail Interview by author, 8 February 1999.

¹¹ Based on twelve aircraft per seventeen squadron, twenty aircraft for the FRS, seven for HMX, and nine percent in depot level maintenance compared to the current number of 231 CH-46s, see Clubb, 8 February 1999.

asset as these aircraft were replaced by the CH-53E Super Stallion. Not only did these helicopters increase the Marine Corps medium lift support, but they also preserved the necessary infrastructure for the medium lift replacement aircraft. The Marine Corps currently owns 45 CH-53Ds, which are distributed between four tactical squadrons and one fleet readiness squadron, all currently based in Hawaii.¹² Representing less than one fifth of the medium lift fleet, the CH-53D is faced with many of the same aging problems experienced by the CH-46 fleet.

Of more recent concern for replacing the CH-46 has been due to its reduction in lift capabilities over the years. In an effort to make this aircraft more survivable on the modern battlefield, new systems and equipment have been added to Marine Corps CH-46s that have significantly increased the aircraft's basic weight.¹³ Over years of continuous use, the CH-46E's engine performance has degraded to a point that aircraft performance is reduced in high density altitude operations such as those associated with the Middle East in the summer or the mountainous terrain in Korea. The combination of these two affects have resulted in CH-46 limitations of twelve combat loaded troops or less, only half of what it was originally designed to lift.¹⁴

The Marine Corps quest for greater tactical mobility on the battlefield has been a long standing goal. In 1947, recognizing the potential of vertical flight, the Marine Corps established its first helicopter squadron, HMX-1, to pioneer new concepts in air

¹² Clubb, 8 February 1999.

¹³ Empty weight of the CH-46D is listed at 13,067 lbs. in Jane's World Aircraft, the average basic weight of HMM-163's CH-46E is 16, 800 lbs. see Jane's World Aircraft, 1970-71; Eric J. Steidl, Maj. USMC, OPSO, Marine Medium Helicopter Squadron 163. Interview by author, 2 April 1999.

¹⁴ Although often capable of carrying more, twelve combat loaded troops is commonly used for simple planning purposes, allowing a reasonable combat radius and the convenience of being one-half of a CH-53 load for a simple bump plan. Steidl, 2 April 1999.

operations. During the Korean War, Marines proved the utility of the helicopter in combat operations but were never completely satisfied with the capabilities of these early machines. With the development of more capable helicopters, the concept of transporting Marines forces into battle became a reality. Ship to shore movement of troops and supplies in helicopters added a new dimension to amphibious operations.

Today, the Marine Corps is foremost an expeditionary force in readiness, with its entire operating forces organized, trained, and equipped for such a purpose. Together with the Navy, the Marine Corps provides naval expeditionary forces with distinct capabilities. As the landward extension of naval power projection, the Marine Corps affords a flexible range of operations from humanitarian assistance to forcible entry. The Marine Corps' need for the MV-22 Osprey is essential to support the continued fulfillment of these missions throughout the full spectrum of operations for the 21st century.

From the general aircraft capabilities table below, it is easy to see that the MV-22 has more than twice the speed and lift capability, and almost five times the range of the CH-46. Some of the less obvious desirable capabilities of the MV-22 include its ability of inflight refueling and its nuclear, biological and chemical protection capability.

CAPABILITIES	CH-46E	CH-46E (BULLFROG)	MV-22
<u>FUEL (LBS)</u>	2,400	4,500	9,600
<u>RANGE (NM)</u>	155	320	720
<u>FLIGHT-TIME (HR)</u>	1+25	2+50	3+00
<u>PASSENGERS</u>	18	9	24
<u>TROOPS (COMBAT LOADED)</u>	16	7	24
<u>AVAILABLE PAYLOAD(LBS)</u>	4,300	2,200	7,000 (VTOL)
<u>MAX. AIRSPEED (KNOTS)</u>	145	145	275
<u>CRUISE AIRSPEED (KNOTS)</u>	120	120	250
<u>MAX. GROSS WEIGHT (LBS)</u>	24,300	24,300	52,870(VTOL)
			60,500(STO)

In the early 1990s, the Navy and Marine Corps presented a common vision for future naval operations in the white papers...*From the Sea* and *Forward ...From the Sea*. This vision concentrates naval power projection at the littoral as a conceptual outline delineating basic operational capabilities required for 21st century warfare. From these two papers the Marine Corps further developed the concept *Operational Maneuver From the Sea* (OMFTS). This overarching concept uses the sea as maneuver space at the operational level, allowing the Navy and Marine Corps team to gain a positional advantage over significant enemy weaknesses. OMFTS further requires moving forces directly from the ship to the objective. This requirement will challenge the Marine Corps' mobility, intelligence, command and control, fire support, aviation, mine countermeasures, and sustainment capabilities. The MV-22 plays a key role as the Marine Corps plans on meeting these challenges through "technology and new approaches in organization, doctrine, tactics and training."¹⁵

Mobility assets that support the OMFTS concept place a heavy reliance on applying technology to provide significantly improved capabilities over current systems. The Marine Corps' ability to maneuver and sustain forces from ships over the horizon to objectives deep within the littoral regions is very limited today. Procurement of the MV-22 and the advanced amphibious assault vehicle (AAAV) are essential for this capability. Low rate fielding of required mobility assets will only delay the Marine Corps long-term strategic direction for the 21st century and a true OMFTS capability.

For the MV-22 fielding plan to be successful, it must first effectively replace the CH-46 and CH-53D helicopters and secondly support the Marine Corps' OMFTS concept for future warfighting. Cost constraints have produced a prolonged procurement plan that will require a thirteen-year transition for the Marine Corps medium lift aircraft. Given

¹⁵ Marine Corps Combat Development Command, Concepts Division, "United States Marine Corps Warfighting Concept For The 21st Century," (Quantico, VA. 1998), I-18.

this prolonged procurement plan, what fielding plan will best support the Marine Corps' need for the MV-22 as these aircraft trickle into its inventory?

MV-22 SQUADRON TRANSITION PLAN

The single factor having the most influence on the MV-22 fielding plan is the procurement schedule for the MV-22 aircraft itself. Significant changes to the MV-22's procurement plan would drastically change its fielding plan. The longer the procurement plan, the more likely that plan may change in the future. The ability to plan a five-year budget is often challenging enough, now try it with a fifteen-year procurement plan for the MV-22. However, to effectively plan for the MV-22 transition, the assumption must be made that the procurement plan will remain as it exists today.

Since the first Low-Rate Initial Production (LRIP) contract, the procurement rate for the MV-22 has been increased to complete the delivery of 360 MV-22s by 2014. Current procurement plans for the Marine Corps calls for eighteen active fleet squadrons and four reserve squadrons with twelve MV-22s each. In addition to these squadrons are the Fleet Readiness Squadron, slated for forty aircraft, and Marine Helicopter Squadron One, slated for eight MV-22s and eleven VV-22(Presidential support aircraft). New aircraft deliveries will follow procurement funding by approximately two years. The first two production aircraft scheduled for delivery by December 1999 were paid for in 1997. The Marine Corps has already paid for sixteen aircraft and will buy seven more this year. Procurement increase for each year are: 10 in 2000, 16 in 2001, 20 in 2002, 27 in 2003, and finally producing 30 aircraft per year until the buy is complete.¹⁶ Even with this

¹⁶ Maj. Richard A. Schott, USMC, ASM Headquarters U.S. Marine Corps. Interview by author, 20 December 1998.

increased procurement rate, a thirteen-year transition period is required to phase out the Marine Corps' CH-46s and CH-53D aircraft.

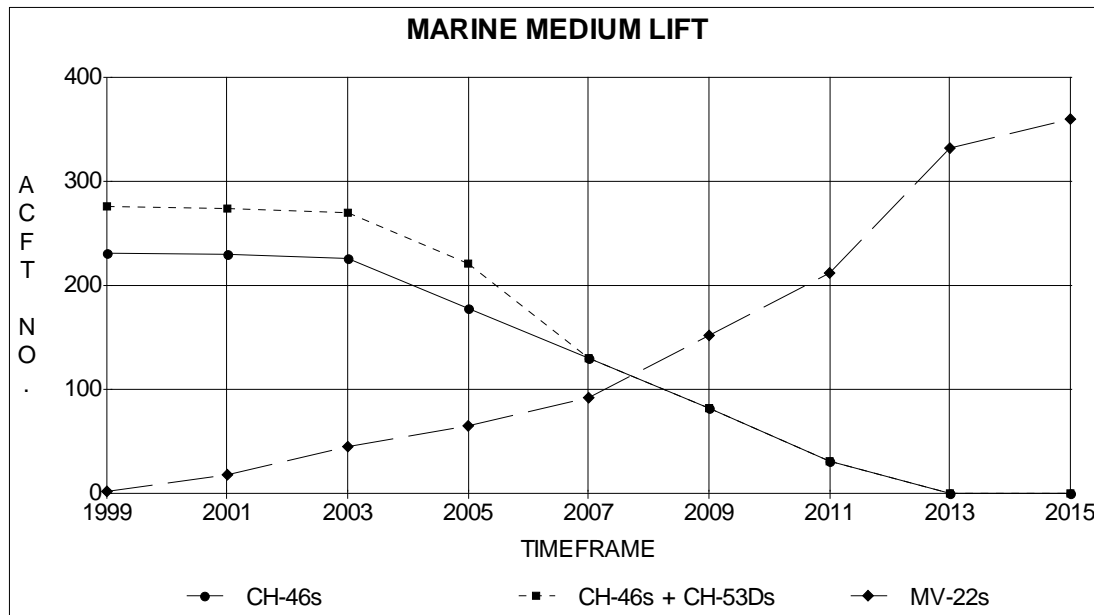
The top rotary-wing priority for Marine aviation is to increase the MV-22 procurement cap to 36 aircraft per year. This increase would allow an additional squadron to transition every other year and reduces the total procurement duration by four years. The overall affects of such an increase would surely solve many problems faced by the current transition plan. Earlier replacement of the CH-53D squadrons could provide substantial savings in both personnel and operating costs. Transitioning squadrons could receive their aircraft numbers sooner providing more time to train and less transition time before squadrons would begin supporting the fleet. Finally, this desirable plan would allow the retirement of the CH-46 in 2007, a four-year savings over the current procurement plan.

The MV-22 procurement rate drives the Marine Corps' proposed VMM squadron transition plan. The MV-22 fielding plan begins in 1999 and continues through 2013. Aircraft deliveries will continue into the year 2014 to ensure aircraft availability to cover normal attrition over the life of this program.¹⁷ Just as in the HMM squadrons, each VMM squadron will operate and maintain twelve aircraft. These squadrons are divided between the Marine Corps' three active aircraft wings and one reserve aircraft wing.

The current plan begins the transition at the 2nd Marine Aircraft Wing, on the East Coast, with the Fleet Replacement Squadron, VMMT-204, followed by four HMM squadrons. Once 2nd Marine Aircraft Wing has these five squadrons and 60 MV-22s, the focus will shift to the West Coast, where the 3rd Marine Aircraft Wing will transition four of its HMM squadrons. After 3rd Marine Aircraft Wing receives its first forty-eight MV-22s, delivery will then shift to the 1st Marine Aircraft Wing in Hawaii with the

¹⁷ Headquarters U.S. Marine Corps, APP, "MV-22 Procurement." Washington, DC, 23 October 1998.

replacements of three HMM (CH-53D) squadrons. This same rotation process between the three aircraft wings is followed again for a second round, this time completing the active tactical squadron stand-up plan. Finally, the 4th Marine Aircraft Wing will take delivery of forty-eight MV-22s to transition its four reserve squadrons. Throughout this process, the Fleet Replacement Squadron, VMFT-204 will receive an additional twenty-eight aircraft, while Marine Helicopter Squadron One (HMX-1) will take delivery of eight MV-22s and eleven VV-22s(VIP models).¹⁸



Medium Lift Assault Support 1999-2004

The Marine Corps is scheduled to take delivery of sixty-three MV-22s between now and the beginning of October 2004, as MV-22 production ramps up toward its current production cap of thirty aircraft per year. The Marine Corps' current CH-46 Fleet Readiness Squadron (FRS), HMT-204, will transition to VMFT-204, and it will take

¹⁸ HQMC, "MV-22 Procurement." 23 October 1998.

delivery of the first two production MV-22s during 1999. Located at Marine Corps Air Station New River, North Carolina, VMMT-204 will be responsible for training Air Force and Marine Corps aircrew and maintenance personnel for tactical fleet squadrons. Expected to reach its initial operational capability (IOC) during FY01, VMMT-204 will get the first twelve production MV-22s delivered to the Marine Corps.¹⁹

The 2nd Marine Aircraft Wing has first priority in the MV-22 fielding plan. MCAS New River will essentially become the V-22 training hub with the FRS, training and aircraft support facilities, and the first four tactical fleet squadrons. The MV-22 transition process is built around the FRS. Based on the success of this process during the AV-8B transition, each MV-22 transitioning squadron will be trained as a unit at VMMT-204. In this process described as an "Amoeba", the majority of the transitioning squadrons' aircrew and maintenance personnel will be trained at one time before splitting off as a separate combat capable MV-22 squadron.²⁰ This "one schoolhouse" approach to training will centralize MV-22 expertise and focus on training squadrons, rather than individuals. It is anticipated that each squadron will take six months to complete this transition from start to finish. Eight months has been scheduled for the first squadron to allow some extra flexibility and provide additional training as time permits.²¹

The importance of the FRS in any aircraft fielding plan can not be over emphasized. This "one schoolhouse" plan to focus on training the entire squadrons rather than individuals is the latest implication of FRS lessons learned. Not only does the FRS have an interest in providing the best possible training, but the squadron receiving the training has vested interest in accomplishing as much training as possible in the given time. This

¹⁹ HQMC, "MV-22 Procurement." 23 October 1998.

²⁰ Headquarters U.S. Marine Corps, "Corporate Memory For New Aircraft Introduction," Washington DC, 29 July 1988, Enclosure 8.

²¹ Schott, 20 December 1998.

environment should enhance training, while also providing an excellent opportunity for squadrons to build camaraderie at the earliest stages of training.

The first MV-22 tactical squadron, VMM-264, will begin its MV-22 transition in April 2001, shortly after returning from a Marine Expeditionary Unit(Special Operations Capable) or MEU(SOC) deployment. This should allow the maximum time to transition and train with MV-22s before its next deployment. Given eight months to complete its transition, by November 2001 VMM-264 should have already accepted the delivery of six MV-22s. During the next year, this squadron is only scheduled to receive three more MV-22s, bringing its total number of aircraft to nine. Sometime between October 2002 and January 2003, VMM-264 should receive its full authorization of twelve MV-22s before assuming its responsibilities as the Air Combat Element (ACE) for its MEU(SOC) deployment workup period. VMM-264 reinforced will support the first MEU(SOC) deployment with MV-22s, scheduled for deployment in July 2003.

VMMT-204 will begin training its second transition squadron in November 2001. Applying lessons learned from the first tactical squadron transition, from here on out it is anticipated this transition training should only take six months.²² However, during this same period VMMT-204 will also start training Air Force personnel. Although some of the details of this interservice training are outlined in a memorandum of agreement between the Marine Corps and the Air Force, many details still need to be worked out before the full impact of this interservice training becomes clear.²³

Much like VMM-264, the second tactical squadron to transition to MV-22s will operate with only seven aircraft for nearly a year. By May 2003, this squadron should

²² Schott, 20 December 1998.

²³ Deputy Chief of Staff for Aviation, Headquarters U.S. Marine Corps, Memorandum of Agreement with Director of Operations, Air Education and Training Command, Subject: "V-22 Aircrew and Maintenance Training at New River, NC," 11 June 1998.

have all of its MV-22s, two months before forming the ACE for the next MEU(SOC) workups.

The next two squadrons to transition to MV-22s will continue in this same process. Once the East Coast MEU(SOC)s begin deploying with MV-22 ACEs, every East Coast MEU(SOC) that follows will deploy with this capability. VMMT-204 should take delivery of four additional MV-22s sometime between training the third and fourth transitioning squadron. This process is essential for meeting training requirements as MV-22 production will soon reach thirty aircraft per year or two and a half squadrons worth of training.²⁴

This early period in the Marine Corps' MV-22 transition plays a critical role for an effective and efficient fielding plan. Aircraft expertise will be needed in the FRS, every MV-22 tactical squadron, Marine Aviation Weapons and Tactics Squadron One, and numerous staff positions. The MV-22 training foundation must be well established prior to 2005, when aircraft production has peaked and earlier trained MV-22 pilots begin rotating to new job assignments.

The CH-46 fleet will also see considerable changes during the first five years of the MV-22 introduction. First, this past February HMT-204 became VMMT-204, as it began passing the CH-46 FRS responsibilities to HMM-164, now stationed at Marine Corps Air Station, Camp Pendleton, California. Redesignated as HMT-164, this squadron will train all the Marine Corps' new and refresher CH-46 pilots until this squadron itself transitions to the MV-22 around the 2010 timeframe.²⁵ As HMT-204 and the first HMM squadrons transition to MV-22, these squadrons will transfer their CH-46s directly back to the fleet to cover current CH-46 inventory shortfalls. Although the number of Marine Corps CH-

²⁴ HQMC, "MV-22 Procurement." 23 October 1998.

²⁵ Maj. Henry J. Domingue, USMC, AMO Marine Medium Helicopter Training Squadron 164. Telephone interview by author, 9 April 1999.

46 squadrons will be decreasing, these remaining squadrons would be brought up to their full allotment of CH-46s. As this CH-46 shortfall gap is closed, the best aircraft may be selected for continued long range employment, while less quality aircraft could be used for replacement parts. By the year 2003, all CH-46 shortfalls should be covered and each additional CH-46 replaced will be transferred to Davis-Monthan Air Force Base for indefinite storage.²⁶

From a fleet support perspective what does all this mean as far as medium lift assault support for the Marine Corps? The Marine Corps' medium lift assault support will continue to decrease as the MV-22 transition begins. First, the Marine Corps has already lost one fleet tactical CH-46 squadrons this year, as HMT-164 assumes all the CH-46 FRS training responsibilities. However, the affects of this loss will be reduced as CH-46s from HMT-204 are transferred directly back to fleet squadrons, strengthening the capabilities of each CH-46 squadron that had been previously operating with less than twelve aircraft. This situation should remain consistent for another two more years until the Marine Corps loses two more CH-46 squadrons in 2001. Again, the total effects of this process should be reduced if transitioning squadrons can effectively transfer their CH-46s directly to CH-46 squadrons short of aircraft.

The Marine Corps' most critical period of medium lift assault support during the MV-22 transition will be between March 2001 and October 2002. During this twenty-month period, the Marine Corps will lose four additional CH-46 squadrons while gaining two inexperienced MV-22 squadrons operating with nine or less aircraft each. As these MV-22 squadrons complete the FRS training, they will be trained at least to the combat capable level or sixty percent combat readiness percentage (CRP). The MV-22 pilot training and readiness manual suggest the time to train a squadron from that level to the combat qualification phase(95 percent CRP) may be accomplished in as little as 27

²⁶ Clubb, 8 February 1999.

weeks.²⁷ This time to train appears very optimistic, since this requires over sixty hours in the aircraft and fifty hours in the flight simulator or a total of 111.5 training hours for each pilot.²⁸ Based on these numbers, a safe inference could be drawn that to accomplish this task the squadron's primary mission would be training and not supporting the fleet. Thus, the Marine Corps most likely will not see MV-22s supporting the fleet until the spring or summer of 2002, and only to a very limited degree at that point. During this period, the Marine Corps will have five fewer CH-46 squadrons to support its fleet than it does today. The effect will be felt on the East Coast, since four of these five squadrons are based at MCAS New River.

Over the next two years, these four MV-22 squadrons will be brought up to full strength of twelve MV-22s each, prior to their MEU(SOC) deployments. VMM-264 should have its twelfth aircraft by January 2003.²⁹ The fourth MV-22 squadron should receive its last aircraft by October 2004. Other than in direct support of the MEU, the first significant support from MV-22s can be expected after VMM-264 returns from its MEU(SOC) deployment in December 2003.

This early period of the MV-22 transition is identified by constant challenges. Once the FRS has become operational, it will immediately begin training the first tactical MV-22 squadron. However, as these tactical squadrons complete FRS training, they will be forced to operate with less than their authorized number of MV-22s while awaiting aircraft coming off the production line. As the FRS completes training of the first MV-22 squadron it will immediately begin training another. The committing of these tactical squadrons as a MEU(SOC) ACEs will require each squadron to solely focus on training for deployment rather than supporting the fleet. Since this plan calls for all MV-22

²⁷ Training and Readiness Manual (T&R) Volume 8, (DRAFT), *MV-22 Pilot*. Quantico, VA: Marine Corps Combat Development Command. December 1998, 1-7.

²⁸ T&R, 1-9.

²⁹ HQMC, "MV-22 Procurement." 23 October 1998.

squadrons to follow this same cycle, each squadron will be so challenged in preparation for deployment.

Committing these new MV-22 squadrons as a MEU(SOC) ACE may distract from the innovative employment of this new and different aircraft. This is not to say that the MV-22 should not deploy as part of the MEU(SOC) ACE at its earliest opportunity.

However, the burden of assuming the ACE responsibilities could be at the expense of building broad-based aircraft expertise. Early employment of the MV-22 should be focused across the full spectrum of operations, including shipboard as well as desert and mountainous operations in support of the Fleet Marine Forces.

Medium Lift Assault Support 2005-2009

By the year 2005, the MV-22 transition process will shift priority to the 3rd Marine Aircraft Wing on the West Coast. In a process very similar to the East Coast transition, 3rd Marine Aircraft Wing will transition four MAG-16 HMM squadrons located at MCAS, Miramar, California. These squadrons will also be trained by VMMT-204, on the East Coast. At this point, it is not clear whether these squadrons will receive aircraft while at VMM-204, or if they will take aircraft delivery upon returning to the West Coast. At this point in the MV-22 transition, aircraft production should allow faster transitions with quicker aircraft deliveries. The 3rd Marine Aircraft Wing should complete the transition of its first four MV-22 squadrons within two years. West Coast MV-22 squadrons will begin supporting MEU(SOC) deployment in 2006, as the ACE. Just like on the East Coast, the intent is to have every West Coast MEU(SOC) deploy with an MV-22 ACE from that point on.³⁰

³⁰Schott, 20 December 1998.

The transition pace will continue to increase as 1st Marine Aircraft Wing becomes the third priority in 2007. Now focused in Hawaii on replacing the CH-53D squadrons, three squadrons will be transitioned to MV-22, while two squadrons stand down. Again, these transitioning squadrons will be trained at VMMT-204. All three Hawaii squadrons will be transitioned within eighteen months and should receive their aircraft upon completion of training. With the anticipated Unit Deployment Program (UDP) beginning for the Hawaii squadrons, the 31st MEU(SOC) could deploy with a MV-22 ACE by 2009. 1st Marine Aircraft Wing will not take delivery of any additional MV-22s until three years later.³¹

After 1st Marine Aircraft Wing transitions three CH-53D squadrons to MV-22s, the transition plan completes the East Coast transition with two more MV-22 squadrons, and then shifts back to the West Coast as two additional squadrons begin transitioning before 2010. By this time in the MV-22 fielding plan, the 1st Marine Aircraft Wing will have three MV-22s squadrons in Hawaii, the 2nd Marine Aircraft Wing will have six MV-22s squadrons at MCAS New River, and the 3rd Marine Aircraft Wing will have four MV-22s squadrons at MCAS Miramar and two at MCAS Camp Pendleton.

Also during this period, MV-22 production should allow VMMT-204 to take delivery of four additional MV-22s and Marine Helicopter Squadron One (HMX-1) to take delivery of eleven V-22s. Slated for a mixture of eight MV-22s and eleven VV-22s (VIP Aircraft), HMX-1 should have all nineteen aircraft by October 2012. VMMT-204 will hold its delivery at twenty MV-22s until all other MV-22 squadrons have received all their assigned aircraft.³²

By the 2005 timeframe, the Marine Corps' medium lift assault support will be changing very quickly. On the East Coast, four of six medium lift squadrons will be MV-

³¹ HQMC, "MV-22 Procurement." 23 October 1998.

³² HQMC, "MV-22 Procurement." 23 October 1998.

22 equipped. After these MV-22 squadrons return from their MEU(SOC) deployment, they will be in general support of the II Marine Expeditionary Force (MEF). The West Coast MV-22 transition will look much the same as on the East Coast only three years later. Although the time between transferring CH-46s from the squadrons and completing transition training may be longer, due to the training logistic challenges between coasts, quicker aircraft deliveries should easily offset this difference. Other than in direct support of the deploying MEU, the West Coast would most likely not see general MV-22 assault support until 2007. Hawaii and Okinawa could expect the same situation as on the West Coast, only facing even greater logistical challenges for training conducted on the East Coast. By 2010, these squadrons would be supporting III MEF in general, if not directly supporting the 31st MEU.

If transitioning squadrons continue to complete MV-22 training in six month intervals, by the fourth and fifth transitioning squadron extended delays may develop before these squadrons receive their new aircraft. For example, the first West Coast squadron to transition to MV-22 is actually the fifth tactical squadron to transition. Allowing eight months for the first squadron and six months for the other four, this West Coast squadron would complete FRS training in November 2003. However, the Marine Corps would only own forty-eight MV-22s or three tactical squadrons and one FRS. This squadron would not begin to take deliveries of MV-22s until October 2004. The trade-off here is between having squadrons trained and waiting for aircraft, or training squadrons in time to accept new aircraft deliveries. It makes sense to get ahead of production to some degree, but if this time is excessive, early losses of CH-46 support and MV-22 training atrophy will be the cost. MV-22 Simulators support could reduce training atrophy affect over short periods of time. However, common sense would suggest pilots who are freshly trained for a new aircraft need to consistently fly that aircraft to maintain proficiency. The general NATOPS, OPNAVINST 3710, requires

aircraft commanders to have flown within the past fifteen days or to take a warm-up flight.

Just as the early commitment to MEU(SOC) ACE responsibilities on the East Coast, the West Coast will be faced with the same challenges in preparation for deployment. Depending on how soon these transitioning squadrons begin FRS training, the now higher MV-22 production rates could provide aircraft to the squadrons earlier in the deployment cycle. Again, the focus would still be on preparing for ACE responsibilities for a MEU(SOC) deployment, rather than support of the fleet.

Medium Lift Assault Support 2010-2014

The final stage of the MV-22 fielding plan will complete the active duty transition by focusing on the final squadrons in the 1st and 3rd Aircraft Wings before shifting to outfit the reserve squadrons of the 4th Marine Aircraft Wing. The last two transitioning squadrons on the West Coast are first in priority. This transition includes HMT-164, the CH-46 FRS, as it ceases the responsibilities of training any additional CH-46 pilots and completes its transition in early 2010. The following year, the Marine Corps' Okinawa squadrons will transition, completing the fielding of all the Marine Corps active duty squadrons. Over the next two years, the Marine Corps will transition four reserve squadrons, two on the East Coast and two on the West Coast. The last two squadrons to transition to MV-22 are reserve CH-53E squadrons. During this period VMMT-204 will also receive twenty additional aircraft to complete the Marine Corps operational force of 312 MV-22s and 11 VV-22s. The remaining aircraft will account for attrition over the entire life of the V-22 program.³³

³³ HQMC, "MV-22 Procurement." 23 October 1998.

During this period, the Marine Corps' medium lift assault support requirements will be accomplished by the MV-22, except for support on Okinawa and by the reserves squadrons. Within two years, these same requirements will be solely supported by MV-22s. If for some reason 1st Marine Aircraft Wing's squadrons from Hawaii do not assume the UDP support, Okinawa could be without medium lift support between 2010 and 2011, as the last two active duty CH-46 squadrons transition. The transition training for the reserve squadrons will also reduced reserve capabilities, when considered separately on their own. This should not be a big factor, since the active duty fleet should be up to full strength and have no problem supporting reserve requirements as these final squadron transition are completed.

It is hard to imagine what condition the CH-46 fleet will be in after 2010. To complete this transition as planned, the Marine Corps must have 48 capable CH-46s at the 2010 year mark; this requirement will continue to drop-off quickly to zero by 2012. This seems reasonable given the Marine Corps' current fleet of 231 aircraft. Under this current procurement plan the Marine Corps needs to continue stretching the operational capabilities of every CH-46 it has for at least four more years. At that point, CH-46 surpluses will be generated, and the workload can be shared among all CH-46s and to a small degree MV-22s. By 2005, the Marine Corps should have a surplus of over fifty CH-46s, and it should develop a program to consolidate the best of the remaining CH-46 fleet to form the core support expected to continue operating to the year 2012.³⁴

This proposed tiltrotor transition plan forms the template of the Marine Corps medium lift assault support capabilities over the next fourteen years. Some changes to this plan are likely to occur over the years. The fact that squadron transitions depend on procurement, and if the procurement plan changes, so will the transition plan. If the

³⁴ CH-46 requirement numbers are based twelve aircraft per remaining CH-46 squadrons. HQMC, "MV-22 Procurement." 23 October 1998.

Marine Corps is successful in increasing the procurement rate to thirty-six aircraft per year vice the current thirty, appropriate adjustments would be necessary in training priorities as well as tactical squadron support. Any aircraft plus-ups in the early years will have a greater effect on increasing transition efficiency. After receiving the first twelve MV-22s and achieving initial operational capability, VMMA-204 is not scheduled for any additional MV-22 until three years later. Aircraft deliveries above the scheduled procurement plan could be used to bring VMMA-204 trained squadrons up to full strength sooner, improving fleet training and support capabilities.

TRANSITIONING PERSPECTIVES

The process of fielding a new and completely different aircraft is an enormous task that can be accomplished in many different ways. Although this process has been completed many times in the past, each transition has its own complicated issues that must be addressed. In the case of the MV-22 fielding plan, the process is complicated by the extended delays in procuring a medium lift replacement aircraft, the low-rate of MV-22 procurement, and the employment of a completely new type of aircraft. Examining the MV-22 fielding plan as it exists today, raises three areas of concern. First, I question the CH-46s ability to continue operating past the 2010 timeframe. Secondly, I believe the earlier retirement of the CH-53D helicopters could save some money further down the road. Finally, I question the early deployment of the MV-22 squadrons as the ACE for a MEU(SOC) deployment.

CH-46s BEYOND 2010

The Marine Corps' CH-46 fleet is rapidly aging as it continuously tries to meet the Marine Corps' medium lift requirements with greater inventory shortfalls. Inventory

shortfalls should be quickly recovered as MV-22 production begins to increase over the next few years. Selective retirement programs should keep the necessary CH-46 fleet flying for many years to come; however the CH-46s warfighting days are truly limited. Although this aircraft can continue to operate for many years, its survivability on future battlefields is of major concern. The CH-46 should still prove effective in the more common permissive environments such as humanitarian assistance operations. The fact that the CH-46 may continue to provide some support in the 2010 timeframe should not distract from its earliest replacement. The Marine Corps' primary mission is still to fight and win wars.

The fact that the last CH-46 squadrons will be operating until 2011 for active squadrons and 2012 for the reserve squadrons should surely warrant a closer look. Having been introduced in 1964, the CH-46 will have forty-eight years of operational service in the Marine Corps before it is fully retired. To put this in a different perspective, just try to imagine operating squadrons of F100 Super Sabres today. No doubt, this is the primary push behind the Marine Corps' goal to increase the MV-22 procurement rate.

EARLY RETIREMENT OF CH-53Ds

One of the first characteristics that stands out in the Marine Corps medium lift transition plan is operational requirements being supported by three different aircraft types from 2002 to 2008 and by two different aircraft types from 2008 to 2013. The cost savings in eliminating the excessive numbers of different airframes used to accomplish these same missions were demonstrated by the Marine Corps in the 1980s and is still valid in the 21st century.³⁵ Staffs and infrastructure associated with supporting three or

³⁵ Blot, 23.

even two different airframes represents a significant saving that could be invested into higher procurement rates.

Within the present procurement plan limitations, the CH-53D squadron transitions could be given a higher priority, and the replacement of CH-53D aircraft could be completed much sooner. The proposed plan calls for the CH-53D replacement to begin in 2007. The total transition of these three squadrons is estimated to take eighteen months to complete. Moving up the transition date of these squadrons directly reduces the time and cost associated with triple staffing for the medium lift support. However, there is a balance to maintain here. The CH-53D has played a key role in limiting the medium lift shortfall, particularly in numbers of aircraft. As HMM squadrons transition, their CH-46s will be returned to the fleet to cover aircraft shortfalls. By 2003, CH-46 shortfalls should be filled and each additional CH-46 replaced will be transferred to Davis-Monthan Air Force Base for indefinite storage.³⁶ If CH-53D are replaced before the CH-46 numbers shortfall is eliminated, the fleet will continue to live with this shortfall until enough CH-46s are replaced to support the remaining HMM squadrons. If the CH-53D squadrons were replaced prior to 3rd Marine Aircraft Wing transitions, two years could be saved from having three different aircraft types supporting one mission.

The primary drawback to earlier replacement of the CH-53D squadrons is their location in Hawaii. This location distracts from much of the benefits of such a proposal. Standing up a secondary V-22 support facility to include simulators and maintenance capabilities in Hawaii to support three squadrons is not as critical as the need to support seven squadrons on the West Coast. These Hawaii squadrons are currently not supporting any unit deployment plan, which also significantly reduces their priority. This could change in the near future; however, the likely change would deploy them to Okinawa, which separates them even further from the East Coast V-22 support system.

³⁶ Clubb, 8 February, 1999.

The first choice to earlier replacement of the CH-53D is to increase the MV-22 procurement rate to thirty-six aircraft per year. This increase could retire the entire CH-53D fleet at least one year earlier than the current plan. Another choice would be to transition the CH-53D squadron following the first four East Coast squadrons. Instead of returning to Hawaii these squadrons could be transferred back to 3rd Marine Aircraft Wing on the West Coast. 3rd Marine Aircraft Wing could transfer three CH-46 squadrons to 1st Marine Aircraft Wing in Hawaii until they transition to MV-22s two years later.

VMM SQUADRONS AS MEU(SOC) ACE

A close examination of the proposed MV-22 Osprey transition plan reveals a focus on establishing the MV-22 squadrons as the ACE for a MEU(SOC). As previously mentioned, this capability will first be reached by 2003 for the East Coast, 2006 for the West Coast, and 2009 for Okinawa. It is not surprising for the Marine Corps to provide its forward deploying units with the latest and most capable equipment; after all they deserve the best equipment available. What is surprising is the short training opportunity these newly transitioned squadrons will have before assuming the additional responsibilities as a ACE for a MEU(SOC). Additionally, the three different Marine Expeditionary Forces would all have MEU(SOC) with very different capabilities for many years. Perhaps it is time to rethink what capabilities best support the Marine Corps requirements during this transition period.

There is no doubt that VMM-264 will be challenged to deploy as a ACE for a MEU(SOC) in July 2003. Scheduled to enter VMMT-204 in April 2001, eight months later the majority of VMM-264 pilots should be at the combat capable level of training. At this point, the squadron will only have six MV-22s. Over the next thirteen months, this squadron should take delivery of its six remaining MV-22, stabilize its personnel for deployment, and continue building flight qualifications and experience in the MV-22.

The majority of combat readiness training is conducted in the tactical squadrons. The MV-22 pilot's training syllabus depicts 133.5 of the 238.5 hour-flight training is conducted in the tactical squadron.³⁷ Annual flight evaluations, flight designations, and instructor qualifications are all over and above this training syllabus. By January 2003, VMM-264 will more than double in size as it joins detachments from at least five different squadrons with four additional aircraft types. At this point, flight training should be focused on integrated training and not individual aircraft training. Over the next six months VMM-264(Rein) will be going through its MEU(SOC) work-up period. Squadron key players, such as the Commanding Officer and the Operations Officer, will be attending numerous meetings and staff planning conferences that will pull them away from the squadron and take-up an inordinate amount of time.

Throughout this period, VMM-264, as the first tactical tiltrotor squadron, will have the additional responsibilities of proving the MV-22's worth and educating the Fleet Marine Forces in how best to employ this aircraft. This includes writing new standard operating procedures, evaluating and expanding mission roles, and supporting numerous high level air-shows and displays. Every evolution involving the MV-22 will require some kind of representation, which may be as simple as the pilots explaining the MV-22's unique requirements and capabilities or may require staff members support for additional planning and briefings. Almost every staff level will have valid reasons for needing someone with MV-22 expertise.³⁸ Each MV-22 squadron will be required to meet similar challenges as it prepares for its MEU(SOC) deployment.

Low initial procurement rates and the Marine Corps' plan to form the air combat element (ACE) for the Marine Expeditionary Units results in six years between the different Marine Expeditionary Forces achieving the same capability. Capability

³⁷T&R, 1-10.

³⁸ Headquarters U.S. Marine Corps, "Corporate Memory For New Aircraft Introduction," Washington DC, 29 July 1988, Enclosure 8.

considerations must be applied to each Marine Expeditionary Units as they are deployed around the world. This may lead to more capable Marine Expeditionary Units covering a much larger geographical area than previously required. As forward deployed units, Combatant Commanders will certainly prefer a Marine Expeditionary Unit with the capabilities of the MV-22.

Each Marine Expeditionary Force tasks its Aircraft Wing to support the Marine Expeditionary Units with the most capable aircraft. From Night Attack Harriers to Night Targeting System Cobras, the Marine Expeditionary Units receive at least a portion of the latest aircraft capabilities. However, each Aircraft Wing will not have MV-22s to support the Marine Expeditionary Units in the early phase of the transition. Today the 31st Marine Expeditionary Unit receives squadron detachments that essentially come from the 3rd Marine Aircraft Wing, but the air combat element is resident in 1st Marine Aircraft Wing. It is unlikely that MV-22 squadrons in the 2nd Marine Aircraft Wing would be tasked to form the air combat element of a Marine Expeditionary Unit other than within the II Marine Expeditionary Force.

During the period between 2002 and 2010, the Marine Corps' active service medium lift requirements could be supported by either CH-46s or MV-22s. Sometime during 2007, MV-22s will make up over half of the Marine Corps medium lift aircraft and support the majority of the medium lift requirements. During the five year period between 2003 and 2008, the Marine Corps must plan on using all of its medium lift assets to fill its requirements. To do this efficiently, each aircraft needs to be appropriately employed.

Early deployment of the MV-22 may best be served as a detachment to the MEU(SOC) ACE formed around a CH-46 squadron. The requirements to prepare a detachment are far less than that of assuming the responsibilities as the ACE. This plan would allow the MV-22 squadrons a much broader spectrum of experience in a shorter period of time. The MEU(SOC) has a legitimate requirement for MV-22 capabilities, but what that

number is still needs to be determined. Surely the early employment of MV-22 squadrons should not be exclusively to MEU, leaving the warfighting contingencies to the CH-46 squadrons.

Limited aircraft, limited experience and expertise, and necessary training will restrict the MV-22's potential for several years as it begins to enter service in the Fleet Marine Forces. During this building period, the aircraft should be appropriately committed to missions where it provides the highest payoff. Priorities of effort will likely change throughout this long transition as more aircraft enter service and expanded mission roles develop. The MV-22 provides significant improvements in range, speed, survivability, and self deployment capability that should be focused on supporting major theater wars (MTW)s. Its ability to support Naval Expeditionary Forces make it the weapon of choice for employment onboard amphibious ships. However, the capabilities need to match the requirements, particularly when assets are in short supply. The fourteen-year MV-22 transition plan should consider matching capabilities with requirements in several separate stages as the MV-22 replaces the CH-46 and CH-53D.

CONCLUSION

A major driving factor in the procurement of the MV-22 has been the need to replace the Marine Corps' aging medium lift assault support fleet; however, the price of new technology does not come cheap. Once a joint program with anticipated high aircraft production requirements, the V-22 essentially became a low production single service aircraft buy with an additional service aircraft purchase added-on.³⁹ Cost has kept

³⁹ Initial JVX planning anticipated a 1,088 aircraft buy with 552 for the Marine Corps, 286 for the Army, 200 for the Air Force, and 50 for the Navy. see "Advanced Military Needs Shaping Rotorcraft Gains," *Aviation Week & Space Technology*, 14 March 1983, 61.

procurement rates low and created an extended fourteen year aircraft transition period. Maintaining the infrastructure and support for the three different aircraft used to accomplish the medium lift mission during this period is far from efficient. The simple solution of increasing the procurement rate is perhaps unfeasible in today's defense budget. The only chance of reducing individual aircraft cost will be to increase total production. If early success of the V-22 fleet introduction can regenerate only half of its previous Department of Defense aircraft numbers requirement, individual aircraft cost would certainly drop.⁴⁰

Even after the 1989 Secretary of Defense decision to cancel the V-22 program and the price of this aircraft drastically increased as production requirements decreased, the Marine Corps held true to a course set over twenty years ago. Today, the Marine Corps' vision of warfare in the 21st century validates the requirements for tiltrotor capabilities in the concepts "Operational Maneuver From the Sea" and "Ship to Objective Maneuver." The MV-22 plays a key role in the Marine Corps' ability to move forces from great distances and rapidly converge them at a decisive point on the future battlefield. However, this capability is not going to happen overnight. Fleet Marine Force medium lift requirements will be supported by CH-46s and CH-53Ds for many years to come.

The Marine Corps is about to enter perhaps its most challenging phase of the acquisition and employment of the MV-22 Osprey: fleet introduction and transition. Although this same process has been accomplished for many other aircraft in the past, the Marine Corps will be expanding its horizons both in interservice training and tiltrotor tactics. Crucial to an efficient and effective transition plan is the ability to constantly and

⁴⁰ Interesting to note the Army is currently seeking 45 new surveillance aircraft, planning to spend \$2 billion. This was one of the planned missions for the Army's JVB, see George I. Seffers, "U.S. Army Seeks 45 New Aircraft For Surveillance," *Defense News*, 1 March 1999, 1; "Advanced Military Needs Shaping Rotorcraft Gains," *Aviation Week & Space Technology*, 14 March 1983, 61.

continuously build aircraft expertise as the MV-22 comes on line. This includes matching pilots and maintenance personnel requirements from initial fleet transition in the Fleet Replacement Squadron to forward deployed tactical squadrons. Highly qualified personnel will continuously be pulled away from fleet squadrons for aircraft particular staffing requirements, tactical training instructors, and others necessary aircraft expertise requirements, challenging each MV-22 squadron's ability to maintain a constant build-up of experience. Continued reliance on the CH-46 during the transition period will enhance a more effective MV-22 transition plan.

During this long transition period, Marines need to continue leaning forward, sharing ideas, and creating solutions as the MV-22 assumes the full responsibilities for the Marine Corps' medium lift assault support requirements. The tendency to use the same one for one replacement methods as the Marine Corps' medium lift helicopters are replaced with MV-22s can be detrimental to innovative employment of this new aircraft. Early transition years will need to be focused on building MV-22 expertise, while at the same time reconstituting the best of the CH-46 fleet to continue to support the Marine Corps for another ten years. Medium lift missions requirements will need to be filled based on capabilities requirements first, not priorities. The CH-46 should be employed wherever and whenever it meets mission requirements, allowing the MV-22 to be employed on steadily more demanding missions and continue building aircraft expertise. The MV-22's efforts must be focused on enhancing the Marine Corps warfighting capabilities first. This may lead to temporary changes in the aircraft mix requirements in support of Marine Expeditionary Units, while MV-22 squadrons gain operational experience in the full spectrum of medium lift requirements.

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